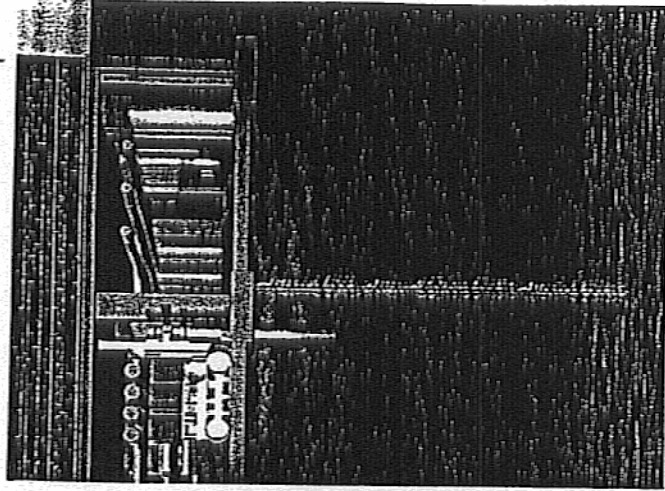


Robert Traylor  
Micropiles in the U.S.A

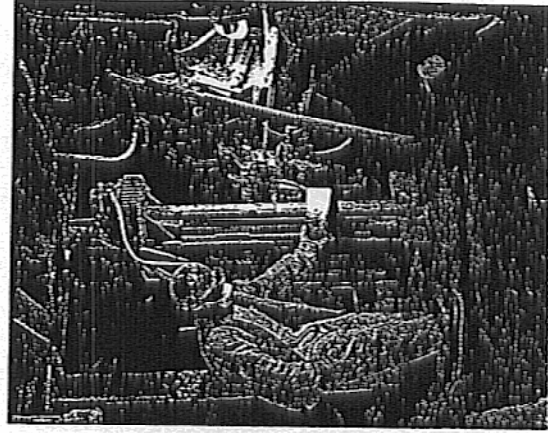
# Micropiles

- ◆ Characteristics
- ◆ Construction
- ◆ Classification
- ◆ Applications



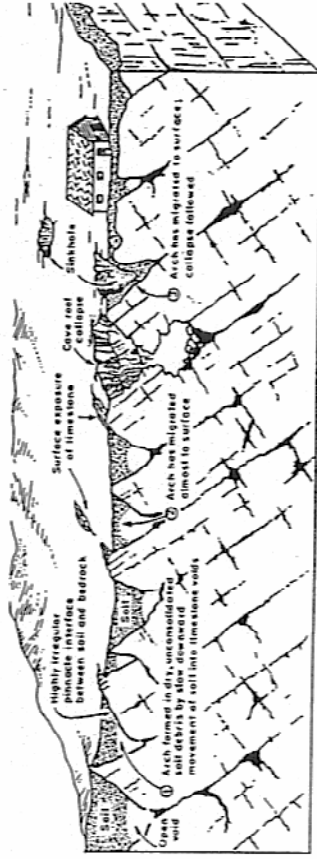
# Characteristics

- ◆ Drilled
- ◆ Grouted
- ◆ Very Stiff
- ◆ Low Headroom
- ◆ Tight Access
- ◆ Obstructions



# USA Ground Conditions:

- ◆ Rock:
  - Limestone
  - Granite
  - Sandstone
  - Shale
- ◆ Urban Fill
  - Debris
- ◆ Clays/Silts
- ◆ Alluvium



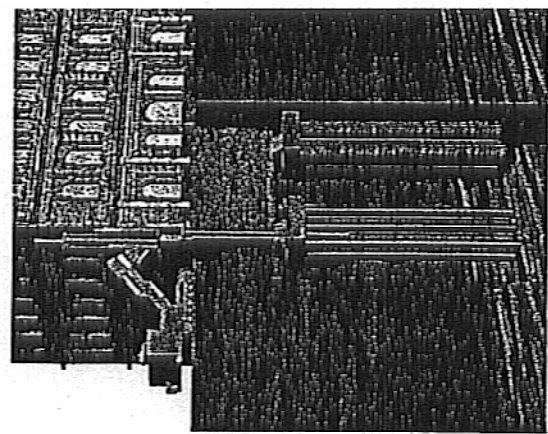
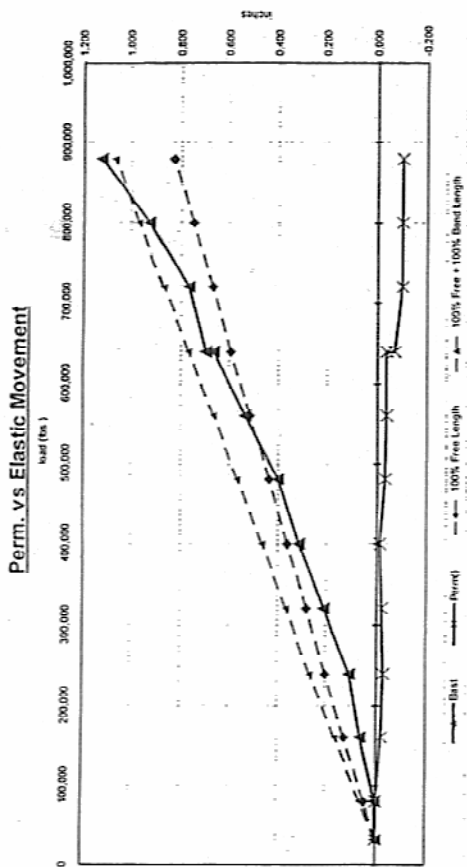
# Characteristics

- ◆ Loads from 25 to 460 tons
- ◆ Wide range of ground conditions



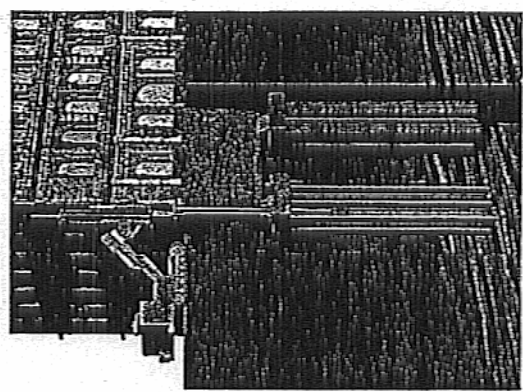
# Case 1 Micropile

- ◆ Stabilize Structures
  - Settlement
  - Uplift
  - Movement
  - Vibration
- ◆ Designed to 200% of Design Load



# Classification FHWA State of Practice

- ◆ Case 1
  - Axially loaded
  - Lateral loads
  - Work independently

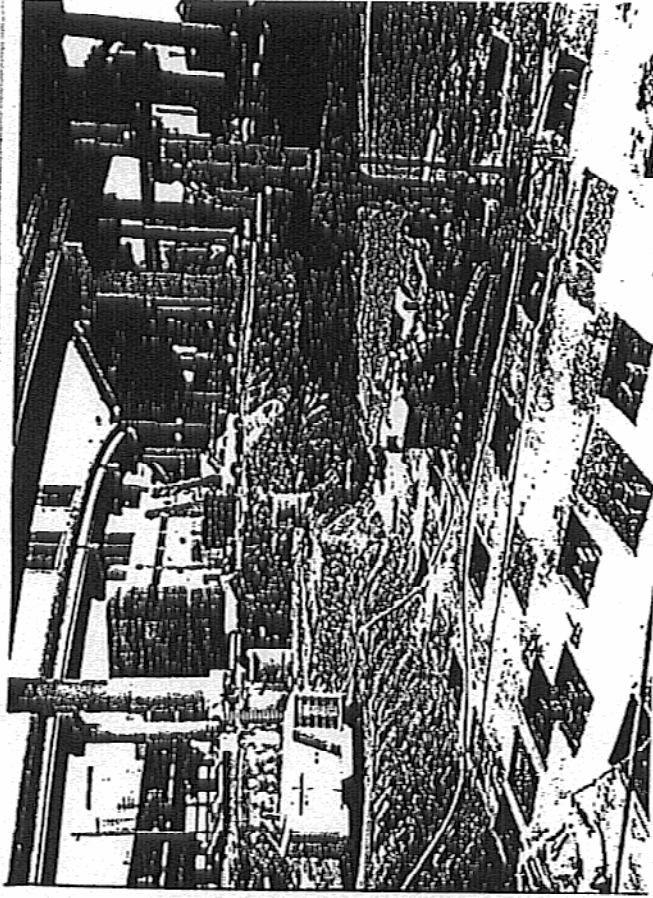
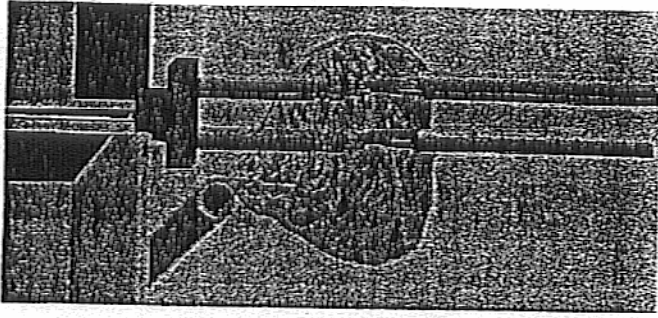


# Classification FHWA State of Practice

- ◆ Type A
  - Gravity grouted
- ◆ Type B
  - Pressure grouted through casing
- ◆ Type C
  - Re-grouted after initial grout cures
- ◆ Type D
  - Multiple re-grouts w/ re-grout tubes

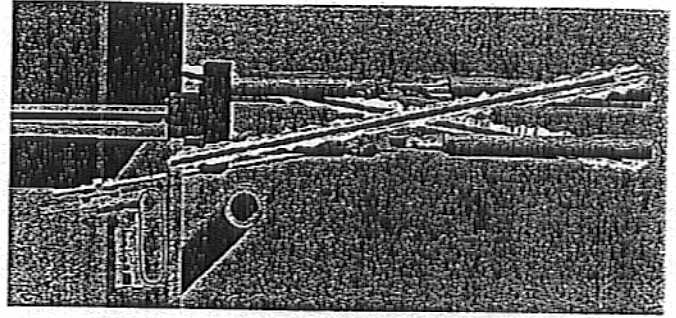
## Gantry Crane Rail Foundation

- ◆ 60's Acid Line Leak Caused Steel Pile Failure
- ◆ 6 Pile Caps
- ◆ Settlement Exceeded 3"
- ◆ Crane Out of Service



## Gantry Crane Rail Solution: Micropiles

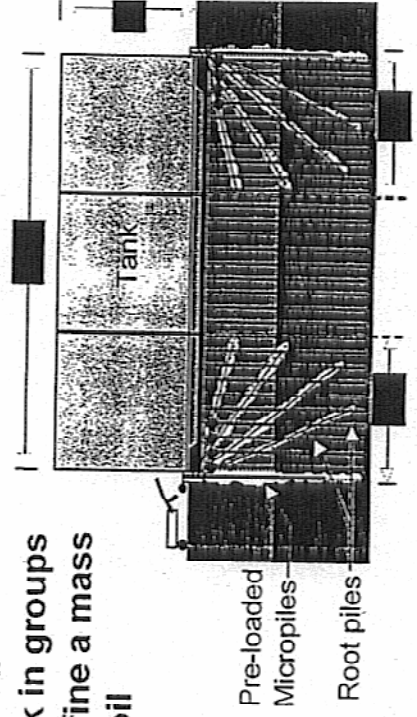
- ◆ 6 Pile Caps Restored in 10 days
- ◆ Plant Remained in Full Operation
- ◆ Double Corrosion Protected



## Classification FHWA State of Practice

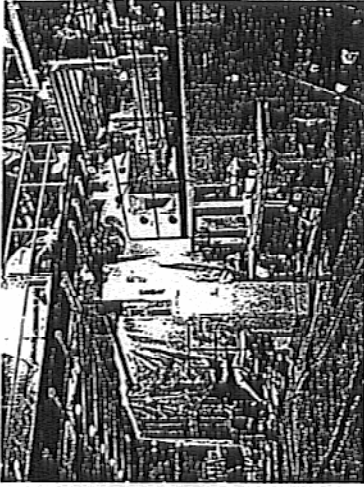
- ◆ Case 2
  - Inclined
  - Work in groups
  - Confine a mass of soil

Tank with Ring Foundation  
Section View

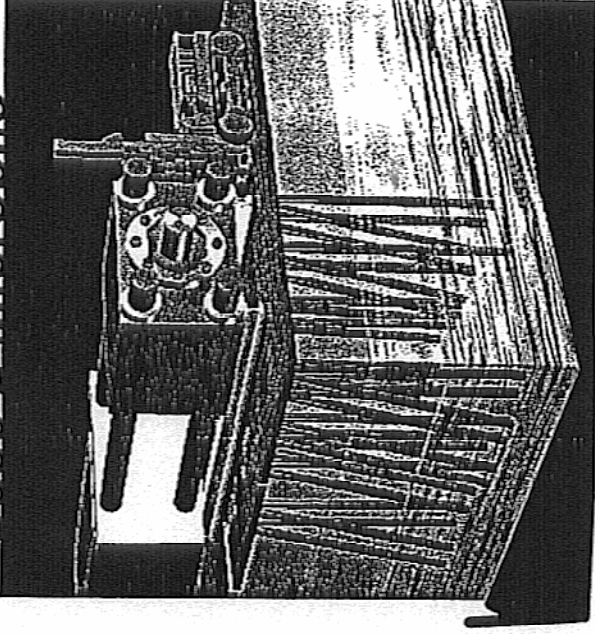


## Engle Machine Foundation

- ◆ Background
  - Machinery manufacturing plant.
  - 1,000,000 lbs.
  - 25% of load is transient

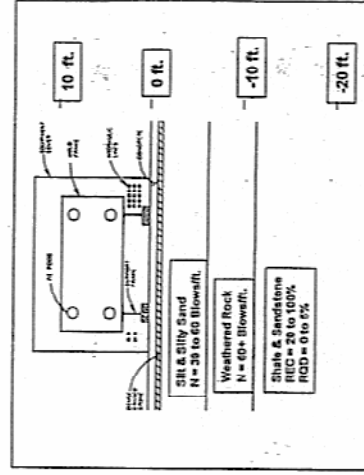


## Case 2 Micropile



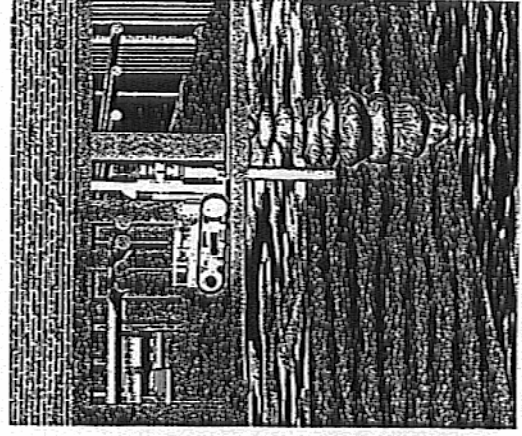
## Engle Machine Foundation

- ◆ Background
  - The main support frame is steel beams supported by leveling pads on the floor
  - Extremely tight machine tolerances.
  - 3 week test run required



## Compaction Grout Pile

- ◆ Low Capacity
- ◆ Support Slab
- ◆ No Structural Connection
- ◆ Closely Spaced
  - 5' on center



# SOILEX Piles

- ◆ 40+ Tons
- ◆ 7' deep
- ◆ Clay - 13 blow

